

**EPA Region 8 Comments on the Denver Arapahoe Chemical Waste Processing Facility
(DACWPF) Post Closure Permit (Final Draft)**

I. Summary/Purpose

Conduct technical review of the DACWPF post closure permit groundwater monitoring system as mandated in the 40 CFR § 264 Subpart F regulations.

II. General Permit Information

DACWPF (permit #CO-20-04-21-01) is a closed hazardous waste landfill in Aurora, CO, currently subject to § 264.310 closure and post-closure care, to include a groundwater monitoring program required under § 264 Subpart F.

III. General Comments

1. For permitted TSDFs, a groundwater monitoring program consists of three phases: (i) detection monitoring (§ 264.98), (ii) compliance monitoring (§ 264.99), and (iii) corrective action (§ 264.100). The phases are sequential with a facility able to move back and forth between phases as certain criteria are met. The regulations establish performance standards that require each facility's groundwater monitoring program to have a sufficient number of wells installed at the appropriate locations. The regulations also require groundwater monitoring wells to be located at depths that can yield representative samples of background conditions and water quality at the point of compliance in the uppermost aquifer (defined at § 260.10 as the geological formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary).
2. Based on EPA's internal hydrogeologic review (see section V.) of the DACWPF subsurface, it appears that "...the monitoring well number and locations are insufficient to monitor the uppermost aquifer."
3. The hydrogeologic review states that the upper and intermediate sandstones, as detailed in the post closure permit, are hydraulically connected and should be considered the "uppermost aquifer" per § 264 Subpart F, and therefore should be, per § 264.98, considered the uppermost aquifer and included in the detection monitoring program.
4. It also appears the current monitoring well network (detailed in appendix F of the permit) is insufficient to properly understand, or adequately monitor, the complex subsurface geology below the facility for releases from the landfill. EPA's hydrogeology review states, "...nearby sites also note that drilling locations showed areas lacking groundwater observed during drilling and subsequent sampling events. The geologic setting for those sites is understood to be a fluvial system with preferential flow in connected sands interbedded with silts, clays, and less significant sand lenses. Far more dense monitoring well networks indicate that the sands do not occur in discrete and blocky units as depicted in the cross sections associated with the permit."

5. It would be appropriate to add PFOS/PFOA to the detection list at 70 parts per trillion (ppt), this level is based on the EPA Drinking Water Health Advisory.

IV. Specific Comments

1. *Section 2.0* of the DACWPF permit states: “The monitoring network for the upper and intermediate sandstone units consists of the following:
 - a. Piezometers GC-18, GC-21, and P-107, which are completed in the upper sandstone unit and which are illustrated in Figure 6.
 - b. Piezometers GC-16, GC-22, and GC-26, which are completed in the intermediate sandstone unit and which are illustrated in Figure 7.
 - c. These piezometers have been used to date to monitor groundwater levels in the upper and intermediate sandstone units.”

Comment: This network is insufficient to adequately monitor the uppermost aquifer, i.e. the upper and intermediate sandstone units, to include the number of wells and sampling regiment.

2. *Section 2.2* of the permit states that “the groundwater monitoring well network for post-closure care detection monitoring is designed to detect releases of contamination in the uppermost aquifer at the designated point of compliance and to assess the direction of groundwater flow in the vicinity of the reconstructed cell.”

Comment: Currently the DACWPF detection monitoring network is not actively monitoring the uppermost aquifer as required by § 264 Subpart F.

3. *Appendix G: Sandstone Units and Leachate Monitoring Plan* states that the annual analyzation of the leachate from the DACWPF landfill will determine if compliance monitoring is required.

Comment: Leachate monitoring can in no way detect a release from the landfill. The upper and intermediate sandstone units should be monitored as the uppermost aquifer, and in compliance with a detection monitoring program. Detection monitoring must be conducted with well sampling and analysis. A minimum of 4 samples per well, semi-annually is required.

4. The groundwater monitoring program under 264.97(h) requires... “the owner or operator will specify one of the following statistical methods to be used in evaluating groundwater monitoring data for each hazardous constituent which, upon approval by the Regional Administrator, will be specified in the unit permit.”

- (1). Parametric analysis of variance.
- (2). Nonparametric analysis of variance based on ranks.
- (3). Tolerance or prediction interval procedure.
- (4). A control chart approach.
- (5). Another statistical test method approved by the EPA Regional Administrator.

Comment: DACWPF should specify one of the four approved statistical analysis methods listed in 264.97(h) in the permit and, should follow the specific analysis procedure stated

in 264.97(h) for the selected analysis method, or an alternative method approved by CDPHE so that the analysis results can be easily reviewed and replicated.

V. EPA Regional Hydrogeology Technical Review

Conducted by EPA Technical Assistance Branch, Hydrogeology Section

The conclusion of this review is that the monitoring well number and locations are insufficient to monitor the uppermost aquifer. There are four wells, one upgradient, P-112, and three downgradient, P-113, P-114A-R, P-115, that are all noted as screened in the "lower sandstone." The conceptual model for the site identifies three main sand units (upper, intermediate, and lower) in approximately the first 150 feet below ground surface. The upper unit is described in site documents as "perched" which would suggest it is disconnected. However, there is also a drain (the Perched Water Drain, PWD) which collects water from this area and the description of the upper unit suggests that it recharges laterally resulting in flow toward the PWD. That indicates that "perched" is not an accurate description of the shallowest water-bearing sands and they should be considered transmissive and monitored. The "lower unit" may have been targeted for monitoring as the most reliable and significant paleochannel of the three identified units but it is likely more accurate to consider these sand occurrences as part of the same geologic setting. Though the shallow-most sands may be less significant for regional groundwater flow than the lower sands, they still may facilitate meaningful flow and should be monitored to assess potential for leaching or an excursion to occur from the landfill. Additionally, monitoring locations downgradient of the drain could be used to detect if flow may be occurring beyond the drain and to characterize any potential water quality impacts.

The hydrogeologic description and cross sections for nearby sites, Lowry Landfill Superfund Site and Highway 30 Landfill, should be considered and an updated understanding of the local and regional hydrogeology should provide the foundation for selection of additional monitoring well locations. Similar to the description in this Permit, both of these nearby sites also note that drilling locations showed areas lacking groundwater observed during drilling and subsequent sampling events. The geologic setting for those sites is understood to be a fluvial system with preferential flow in connected sands interbedded with silts, clays, and less significant sand lenses. Far more dense monitoring well networks indicate that the sands do not occur in discrete and blocky units as depicted in the cross sections associated with the permit. Additionally, a continuous aquitard or aquiclude does not exist between the depths relevant to the three units identified in this permit. While it may be appropriate to conclude vertical flow is insignificant, hydraulic connectivity between sands between the surface and 150 feet below ground surface likely exists. The sands containing groundwater in the area described as the "upper sandstone" should be monitored in addition to the deeper units targeted by the monitoring network. Monitoring may also include the flow and quality of water collected by the PWD.

VI. EPA RECOMMENDATIONS

1. CDPHE should utilize new information provided in this review to revoke the DACWPF post closure permit and reissue it to include detection monitoring of the upper and intermediate sandstone units as the uppermost aquifer.

2. CDPHE should require an updated groundwater investigation and analysis be conducted in order to properly assess the complex hydrogeologic conditions of the site. This will allow for installation of the proper number of wells needed for detection to be determined, as well as the proper locations and screening depths. It should also include an evaluation of current wells to determine if they can be converted to monitoring wells, or if new wells need to be installed.
3. Monitoring of the flow and quality of water beyond the PDW should be included in the permit to aid in determining if releases are occurring.

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